The condition of things, however, in the ovule is very different from what it is in the anther, because early in the evolution of the spermaphytes the necessity for a definite spore for distribution disappeared, as the ovule retained the gametophyte within its nucellar tissue. The time has been long enough for the complete elimination of the spore. But in the case of the anther or microsporangium, the process has perhaps only begun; or perhaps it would be better to say that the conditions are being ushered in, in some cases where pollinia are formed, which in time may result in the elimination of the microspore from some of these forms.

In the elimination of the spore from the macrosporangium of the spermaphytes, they have arrived at a new morphological attainment, the development of the embryo-sac or gametophyte, directly from the archesporium or nucellus. The gametophyte of the angiosperms is very simple and rudimentary compared with that even of the gymnosperms, a few free cells, perhaps all of them potential eggs. Being free and few of them, they are in intimate relation with each other and are more subject to the secondary influences of fertilization than the endosperm cells of gymnosperms are.

Perhaps, for this reason, the angiosperms have arrived at a second and more remarkable morphological attainment, in the development of the second endosperm subsequent to fertilization. The interpretation of this may lie partly in the results of 'double fertilization,' and related phenomena, when the second sperm sometimes unites with one of the potential eggs, or with the 'endosperm nucleus' to form the second endosperm, or may possibly itself sometimes form a separate endosperm. It is well known that in the pteridophytes and gymnosperms often several eggs are fertilized in one prothallium, and several embryos begin to develop. Finally one of them usually outstrips the others, which then atrophy. In the angiosperm embryo-sac the potential eggs are all free and so situated that they are immediately and profoundly influenced by fertilization of the 'privileged' egg.

The endosperm nucleus, or one of the other potential eggs, being fertilized by the second sperm, may be so immediately influenced that, instead of developing into an embryo which in a short time would be outgrown and destroyed, it is directed into a new channel of development, which has resulted in the evolution of a new plant generation to be utilized as a nutrition body by the privileged embryo. If the secondary influences of fertilization in angiosperms have acted somewhat in this way, it might account not only for the retarded development of the so-called 'endosperm' in the angiosperms, but also for some of the phenomena known under the expression *Xenia*.

Geo. F. Atkinson.

NATURAL HISTORY WORK AT THE MARINE BIOLOGICAL LABORATORY, WOOD'S HOLL.

Natural history has been a growing element in the work of the Biological Laboratory at Wood's Holl. All departments represented at the Laboratory have made contributions in this field. Life histories have been studied principally in connection with embryological research, as, for example, in Conklin's work on 'Crepidula,' Lillie's on '*Unio*,' Mead's on 'Annelids,' Foot's on 'Allolobophora,' Clapp's on the 'Toad-fish,' Patten's on '*Limulus*,' Wheeler's on 'Insects,' Watasé's on the 'Fireflies,' etc. Within the last few years natural history studies have acquired wider and more independent interests with us. Animal behavior has engaged the attention of a number of investigators, led by Loeb, Wheeler, Thorndike and others. The demand for instruction followed the development of various lines of research, and the courses in general physiology and animal psy-

chology were, so to speak, spontaneous inevitables. The course in nature study, introduced for the first time last summer, furnished a typical illustration of the convergence of interests now cooperating at the Laboratory. Although the class only numbered fifteen members, over thirty investigators contributed to the instruction given, and a large share of the lectures, laboratory work and field studies were of the nature of research. Indeed, problems and demonstrations drawn from original work actually in progress, and presented by the investigators themselves, characterized the course throughout.

In the further development of this course in natural history, we are looking forward to hoped-for facilities far beyond our present realizations. The creation of a Natural History Farm at Wood's Holl may be somewhat remote still, nevertheless the project is entertained, and a small step has already been taken in anticipation. The columbarium now under cultivation is, I venture to hope, the first instalment of such a farm. This collection of pigeons, already the largest of the kind in existence, and rapidly increasing by accessions from all parts of the world, was undertaken with several ends in view. The pigeon group, containing between four and five hundred wild species, and not less than one hundred and fifty domestic species or varieties, offers one of the most favorable fields for the comparative study of variation and for experimentation in dealing with the problems of heredity and evolution. While the principal aim in making the collection was the investigation of problems, the farm project has been kept steadily in view. The columbarium would form one section of the farm, and exemplify its uses and unique advantages for every side of natural history.

Ever since the second birth of natural history in Darwin's 'Origin of Species,' the need of experimental work on *living* animals has been clearly seen. The two elements of success in such work are *control* and *continuity*. Both elements would be secured in an institution that combined efficiently organized laboratories and a farm stocked, manned and equipped for experimental research.

The idea of such an institution was elaborated a long time ago in the 'New Atlantis,' in which is described a model college and farm instituted for the experimental study and interpretation of nature. This model was esteemed too vast and high for imitation, and the great and marvelous things it promised only served to emphasize its dreamland picturesqueness. It was only after the doctrine of Natural Selection had taken a deep hold of the scientific world, that Lord Bacon's dream found an echo in the schemes proposed independently by Romanes and Varigny.

The question of the transmutation of species stood foremost in the minds of these naturalists, and it seemed as if the world would never be quite convinced without experimental tests of a crucial kind. For such tests it was obvious that plants and animals must be studied as living things; that the conditions of life and propagation must be such as could be precisely defined and made to vary in ways admitting of control; and that the work must be carried continuously forward from year to year. Out of these requirements arose the idea of an experimental farm.

General biology, or modern natural history, is now seen to stand in pressing need of something like the model college of Bacon's *Nova Atlantis*, embracing not only an experimental farm, but also laboratories and a strong body of investigators with a competent staff of assistants. Naturalists everywhere appear to be fully awake to this important need, and Professor Meldola (*Nature*, Feb. 13, 1896) did not ex-

press too strongly the general conviction when he declared—"The one great desideratum of modern biology is an experiment station where protracted observations can be carried on year after year on living animals."

The ideal plan would certainly make the farm an integral part of a natural history institute, according to the idea of the Baconian model; and herein may be seen the propriety of the name, 'Baconian Institute of Experimental Evolution,' proposed for such a foundation by Professor Osborn.*

An institute organized to meet the common needs of naturalists, and supported as a biological center—conditions approximated at Woods Holl—would obviously supply a strong combination of forces, and so ensure to a natural history farm its higher utilities as a source of scientific discovery and of unparalleled facilities for instruction.

C. O. Whitman.

CHRISTIAN FREDERIK LÜTKEN.†

The death of Professor Lütken of Copenhagen removes one of the last of that band of eminent zoologists whose long and active lives cast such luster on the Scandinavian countries throughout the last century.

Christian Frederik Lütken was born in Sor on October 4, 1827, the son of Professor Johannes Christian Lütken, Reader in Philosophy at the Academy there. It was during his last year's study at the Academy, which he entered in 1844, that young Lütken was induced by the lectures of Hauch and Steenstrup to turn seriously to zoology; and this he pursued when he passed to the University of Copenhagen in 1846. There he came in contact with Liebmann, Forchhammer, Ibsen, Eschircht, H. C. Oersted, and 'again Steenstrup, who was in the same year appointed professor of zoology at the University. Lütken's zoological studies were, however, interrupted by the troubles of 1849–50 (first Schleswig-Holstein war), when he served as a volunteer and took part in the battles of Ullerup and Isted. He was accorded permission to complete and publish his first scientific work during the winter 1849–50, and in 1852 finally left the army to fill a place as assistant in the Zoological Museum of the University, taking the degree of Magister in the following year. The position at the small University Museum was neither assured nor well paid, but it was improved some ten years later, when the Royal Museum was joined with that of the University to form the existing Museum of Natural History, in the second division of which (dealing with fish and lower animals, except Arthropoda) Lütken served as assistant to Steenstrup. It was not till the death of J. Reinhart in 1882 that he obtained an independent appointment as Inspector of the First Division, which was now made to include all vertebrates. After Steenstrup's retirement, on January 28, 1885, Lütken was appointed professor of zoology at the University and thus became chairman of the Museum Board, while he continued to direct the Division of Vertebrata. In 1885 he married his cousin Mathea Elizabeth Müller, who died in 1890, leaving no children. Some five years later Lütken's own energies began to yield to attacks of illness; in the summer of 1898 he had a paralytic stroke from which he never recovered; he therefore retired from his official posts at the beginning of 1899, and after a long struggle finally succumbed on the 6th of February at the age of 73.

Lütken's labors fall under the heads of museum work, education and descriptive zoology.

The Zoological Museum of Copenhagen,

* 'From the Greeks to Darwin,' p. 93.

† Much of the personal matter in this notice is gleaned from an article by H. F. E. Jungersen in *Illustreret Tidende* (Copenhagen) for February 17th. The article is accompanied by an excellent portrait.